

INSTRUCTION MANUAL
for
THE ATARI MUSIC COMPOSER

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HOW TO USE THIS MANUAL

This manual is in four parts. Part One is a general description of the Atari Music Composer Program. Part Two is a step-by-step tutorial on how to use the cartridge.

The best way to use this manual is, first, read all the way through Part One. This will give you a general idea of what the cartridge is about. Don't worry too much about the specific details. That will come later.

After you have read Part One, follow the instructions in Part Two. It will take you through a sample session, and show you exactly how to use the Cartridge. From time to time, you will want to refer back to Part One for more detail. And, eventually, you should read completely through Part One at least one more time.

For advanced users, Part Three describes the music file storage format, and how to manipulate the files with external BASIC programs. Example BASIC programs to generate notes and to write harmony lines for a given melody are included.

Part Four of this manual is a brief listing of each of the commands, and of each of the file formats. This section is intended as a quick look-up reference after you are familiar with the commands.

PART ONE

GENERAL DESCRIPTION OF THE ATARI MUSIC COMPOSER

WHAT DOES IT DO?

The Atari Music Composer Cartridge will enable you to enter music for up to ten sections into the computer. You can then listen to your music while you see it displayed on the video screen. You can change any note of any measure of the music you have written. The computer will correctly accept music written in any key. If you like, it will check for the proper number of beats per measure for different meters.

You can quickly and easily change the tempo of your music. After you have entered your music into the computer, you can arrange the music to play the different sections in the order you choose. Up to four lines can play at once. Music can be transposed, and it can be played at different volumes. You can display any single line of music on the video screen while the music is playing. Or, you can display a line of music that does NOT play, while you play another instrument along with the computer.

Once you have entered your music into the computer memory, you can save all or part of it on cassette or disk. Since the music is stored as a list of numbers on the cassette or disk, you can also write BASIC programs that will change the music you have written. For example, you can convert a melody line into melody plus harmony. You can even write BASIC programs to "compose" music by rules you devise.

THE MAIN MENU

The Atari Music Composer Cartridge is a computer program that is arranged as a group of menus. When first started, the computer displays the Main Menu of six selections.

These selections are:

- Edit music
- Arrange music
- Save
- Retrieve
- DOS
- Listen

Some of these selections will display a menu of their own. One of the commands will always be "Stop" or "S", which will return you to the Main Menu. Some of the sub-menu commands will allow a third level of commands. These commands also have a "Stop" or "S" command that returns you to the sub-menu. Another "Stop" command will call up and display the Main Menu.

This hierarchy of menus is at once very powerful and very straightforward to use. You don't need to memorize all the many commands available. You simply deal with the commands for your current section or sub-section of the program.

To select a menu item, simply type the first letter of the item and then type the return key (which we will refer to as "<ret>"). For example, to select Edit music, type "E<ret>". You can actually type it all out --"Edit music <ret>"-- if you like. The computer just looks at the first

letter you type and it ignores the rest.

You can "erase" letters by pressing the BACK SPACE key once for each letter you want to delete.

After you have typed your command, be sure to type the <ret> key. That's the computer's signal to act upon what you have typed in the command line, and it won't do anything until it gets that <ret>.

EDIT MUSIC

Typing "E<ret>" from the main menu, to Edit music, immediately causes another menu to be displayed. This is actually a combination of menu and status. The menu selections appear on the left with their status values to the right. The display looks like this:

EDIT MUSIC

Phrase	
Meter	4/4
Key sig.	OS
Tempo	2
Check measures	OFF

WHICH?

These commands allow you to change music that has already been entered into the computer memory. Or they allow you to more easily enter unusual musical formats. Change PHRASE allows you to enter new music, or to edit notes already in memory. Change METER and CHECK MEASURES help you keep track of the durations in a measure of music. KEY SIG. allows you to change music already entered to display in any key, or to enter music that was written in a key other than C. TEMPO changes the speed at which the music is played by the computer. And STOP returns you to the Main Menu.

CHANGE PHRASE

This command allows you to enter your music into the computer memory, or to edit notes already in memory.

When you type "P <ret>" for change Phrase, the computer will ask "Phrase #?". There are ten phrase numbers, 0 to 9. These allow you to label the different musical sections so you can manipulate them later with the "Arrange" command. You must type one of the digits, 0-9, and <ret>.

Next, the computer will ask "ERASE?". If you wish to erase all previous measures in the phrase, as when you are entering new music, type "Y<ret>". Type "N<ret>", or just "<ret>" if you DO NOT wish to clear the phrase.

If you do not erase the phrase, the computer will ask "MEASURE #?", so you can edit any previously entered measure. You would type the measure number and <ret>. If you do erase, the computer puts you directly in Measure #1, after it has cleared the phrase.

Next, the computer displays two music staves. These are the standard piano staves, with the treble clef on the top staff and the bass clef on the bottom staff. Each octave range is indicated by a different background color. Unless previously changed, the key will be C (no sharps or flats), and the meter will be 4/4. The dark vertical bar positioned just after the time signature is the cursor. This is where the next note you write will be entered. As you enter notes, the measure will be played, and the cursor will move to the right.

Three numbers are under the music staves. They tell you which phrase you are in (PHRASE ###), which measure of that

phrase (MEASURE ###), and the remaining free memory space,
expressed in notes that can be stored (#### FREE).

On the last line of the screen is the prompt "SMI, NOTE?". This is a sort of menu, all scrunched down to one line. It means:

```
Stop
Measure #
Insert measure
enter next NOTE
```

So, if you want to return to the Edit Music menu, you type "S<ret>". To go to the next measure or to any other previously entered measure, type "M#<ret>", only instead of typing "#", type the actual measure number, as "M12<ret>".

If you want to insert a new measure somewhere in your music, say between measures 2 and 3, first type "M3<ret>". Measure 3 will be displayed and will play. Next, type "I<ret>". This will "push" all measures from measure 3 (where you are) to the last measure in that phrase, up one measure. What was measure 3 is now measure 4, what was measure 4 is now measure 5, and so on. Measures 1 and 2, below the Insert command, are not changed. Only measures above the Insert are moved. And the new measure 3 is empty, ready for you to put notes into it.

HOW TO ENTER NOTES

To enter a note you must give the computer several pieces of information. First, you must tell it the letter name of your note: C, D, E, F, G, A, B, or R (rest). You may indicate a sharp or a flat or a natural by following the letter name with "S" or "F" or "N". An accidental will change all of the same notes following, until the end of the measure, or until another accidental for the same note.

Next, you tell the computer which octave the note is in. This is a number between 3 and 6. Octave 3 starts with the C below middle C. Octave 4 starts with middle C. Octave 5 starts with the C above middle C. And Octave 6 starts and ends with the C above that, "high C".

You only need to enter the Octave Number to change octaves. If you do not enter an Octave Number, the computer uses the last one it was given.

(music example here)

Middle C	Octave 3	Octave 4	Octave 5	Octave 6
----------	----------	----------	----------	----------

Durations go from whole notes to thirty-second notes:

W = = Whole note

H = = Half note

Q = = Quarter note

E = = Eighth note

S = = Sixteenth note

T = = Thirty-second note

Note values may be followed by a dot, ".", to make them

1/2 longer than normal. If you wish to tie the note to the one that will follow, type "T". This appears as a tie () on the screen, and it will cause the note to continue to sound until the next note is started. Normally, without the tie, there is a small space of silence between each note.

Some examples:

(music examples 1 to 5 here)

- (1) Low C, a sixteenth note.

Type: C3S<ret>

- (2) Middle C, a dotted eighth note.

Type: C4E<ret>

- (3) E above middle C, a quarter note tied to --

D# above middle C, a dotted eighth note tied to --

C above middle C, an eighth note

Type: E4QT<ret>

DSE.T<ret>

C5E<ret>

- (4) An Eighth rest

Type: RE<ret>

- (5) Bb above middle C, a half note.

Type: BF4H<ret>

To sum up, the format for entering a note is:

LETTER (ACCIDENTAL) OCTAVE DURATION (DOT) (TIE)

Accidental, Dot and Tie are options and may be left out.

If Octave is not entered, the computer uses the last Octave

Number it was given. Letter and Duration are not optional and must be included.

The format for entering a rest is:

R DURATION (DOT)

Dot is an option that, as for note durations, will cause the rest to be half again as long. "R" (for Rest) and Duration must be included.

CURSOR CONTROL KEYS

The cursor control keys allow you to insert new notes between existing notes, or to delete notes. The keys are:

CTRL <--	move cursor left
CTRL -->	move cursor right
CTRL DELETE	delete one note
CTRL CLEAR	delete all notes in this measure

The CTRL key must be held down while depressing the cursor control keys. New notes will always be inserted just before the cursor. Therefore, to insert a note between existing notes, use the CTRL <-- or CTRL --> to position the cursor just after where you want the new note to be inserted. Then enter the note in the normal way.

CTRL DELETE will always delete the note that is within the dark cursor area. To delete a note, use CTRL <-- or CTRL --> to position the cursor exactly on the note you wish to delete. Press CTRL DELETE, and the note is gone.

CTRL CLEAR will always delete all notes in the measure, regardless of where the cursor is. Press CTRL CLEAR and the measure will be empty of notes.

CHANGE METER/CHECK MEASURES

Since the computer doesn't have to keep time with anybody but itself, it really doesn't care what meter you use. You can make any measure contain any number of notes. It won't get confused and miss beats, as a human performer likely would. But if you wish to stay within a particular meter, you can have the computer perform a measure check while you are entering notes under the "Edit Music" command.

While in the "Edit music" menu, typing "C<ret>", for "Check meter", will cause the status word to change from "OFF" to "ON", or from "ON" to "OFF". If the Check meter status is "OFF", then it will have no effect, nor will "Meter". If Check meter is "ON", then while you are entering notes the computer will not allow you to leave your current measure until the number of beats is correct. It will say "Measure too short" or "Measure too long". The exception is, on the first and last measure, you may have fewer than a full measure of beats.

The command "M<ret>" for change Meter allows you to set the number of notes per measure. 4/4 sets four quarter notes per measure. The computer will allow any combination of notes or rests that is equivalent to four quarter notes per measure. One whole note, for example. Or two eighth notes, one quarter note, and one half rest. A meter of 2/4 will allow the equivalent of 2 quarter notes per measure. That could be one half note. Or one quarter note and one quarter rest. Or sixteen thirty-second notes.

Once your music has been entered into the computer memory, the Change Tempo/Check Measures commands has no

further effect. These commands are only an aid to help you enter music into memory correctly. They do not affect how the computer plays the music.

CHANGE KEY

Key signatures are normally written as a number of sharps (#) or flats (b) on the staves between the clef and the time signature. For example:

(music examples here)

Key of D Major
Key of B minor

Key of G Major
Key of E minor

Key of Eb Major
Key of G minor

The Change Key command allows you to enter music in the key in which it was written, even if you aren't sure what the key is. Before entering your music, simply count the number of sharps or flats in the Key signature. Then, from the "Edit Music" menu, type "K<ret>". The computer will respond with "New Key Sig.?". You type the number of sharps or flats, and then "S" if they were sharps or "F" if they were flats, and <ret>. In the above three examples you would type "2S<ret>" for the first, "1S<ret>" for the second, and ""2F<ret>" for the third. The computer will accept and display music in the proper key.

Changing the key signature AFTER music has been entered in memory will cause it to be displayed in the new key. However, it will play in the original key.

CHANGE TEMPO

You can have the computer play your music faster or slower with the Change Tempo command. There are 9 tempos, numbered from 1 to 9. A tempo of 1 is fastest, a tempo of 9 is slowest. You can change tempo any time you wish, before or after entering music. From the "Edit Music" menu, type "T<ret>". The computer will respond with "New tempo?". Type the tempo you want, 1 to 9, and <ret>. The new tempo will be entered and you will see it as a status number after the word "Tempo" in the menu.

ARRANGE MUSIC

After music has been entered into the computer memory, you can arrange how the computer is to play it. There are four voices, or sound channels, numbered 1 to 4. Each voice plays independently of the other three. This allows you to arrange, or program, each voice differently.

When you type "A<ret>" from the Main Menu, you are telling the computer you want to Arrange music. The computer will respond with "Voice #?". You tell it which voice you want to arrange by typing the number, and <ret>. For example, "1<ret>". If this is the first time you have given the "Arrange music" command, the Arrange Menu will be displayed:

ARRANGE MENU

Count

Display

Goto line

M for this menu

Play phrase

Stop

Transpose

Volume

SPACE BAR TO GO ON

If you press the space bar (or any other key), the menu will be replaced by the Arrange Voice Program. This is a list of 20 numbered lines, and on the bottom line is the unpronounceable magic word "CDGMPSTV".

The numbered lines are the 20 program steps available to each voice. And the magic word is the first letter from the Arrange music menu selections. To display the menu again, type "M<ret>". Type the space bar, and you are back again with the 20 program steps.

After the first time you call "Arrange music" from the Main Menu, the Arrange menu will NOT be displayed. Instead, you will immediately set the 20 program steps for the voice you asked for. If you want to see the Arrange menu, just type "M<ret>".

When you are ready to return to the Main Menu, type "S<ret>", for "Stop".

All the other commands in the Arrange menu are actually programming steps. They are not done when you type them in. Instead, they are entered as one of the 20 program steps. The computer will do all the steps you have programmed when you give it the "Listen" command from the Main Menu.

DISPLAY

Display tells the computer to display the notes of that voice as they are being played. While all four voices can play at once, only one voice can be displayed at a time.

The Display instruction selects which of the four voices is to be displayed on the video screen. That voice will continue to be displayed until another voice finds a Display instruction. If two or more voices have the Display instruction at the same time, the lowest numbered voice will be displayed. To enter the Display command, type "D<ret>".

PLAY

Play tells the computer to play a phrase. To enter the Play instruction, type "P<ret>". The computer will ask "Phrase #?". Enter the number of the phrase you want it to play at that step, and <ret>. Any phrase, 0 to 9, may be entered at any of the 20 Arrange program steps, in any of the four voices.

The Play instruction is the only instruction that has duration. Duration is the time the computer takes to play the phrase. All the other instructions have no duration. This means that in order to make phrases in different voices play together, you only count the play instructions. Don't count the other instructions.

For example, suppose you have four phrases of music. The meter, or beats per measure, is the same for all. Phrase #1, phrase #2, and Phrase #3 have four measures each, so they have the same duration. Phrase #4 has eight measures, so its duration is twice that of the other phrases--because eight measures take twice as long to play as four measures. Now, suppose your Arrange program looked like this:

Voice #1	Voice #2	Voice #3
1 Display	1 Play Phrase 2	1 Play Phrase 4
2 Play phrase 1	2 Display	2
3 Play phrase 2	3 Play phrase 3	3
4	4	4

Since only the Play instruction has duration, voice #1 will Display and Play phrase 1 while voice #2 plays phrase 2 and voice #3 plays the first half of phrase 4. Then voice

#1 will play phrase 2 while voice #2 Displays and Plays phrase 3 and voice #3 continues to play phrase 4. Then, since there are no more instructions, all the voices will stop.

To keep all this straight, you really only need to remember one rule: The Play instruction is the ONLY instruction that has duration. So, when you are deciding when each voice plays a phrase, only count the Play instructions. Don't count the other instructions.

VOLUME

Volume tells the computer how loudly you want Phrases played. For each voice, the Volume instruction will affect all further Play instructions in that voice. The loudness won't change again unless the computer gets another Volume instruction for the same voice.

To enter the Volume instruction, type "V<ret>". The computer will respond with "Volume?". Volumes are 0 (zero) for off, and the six standard loudness abbreviations, pp, p, mp, mf, f, and ff. The softest sound is pp, and the loudest is ff. You would give the computer one of these, and <ret>.

If you don't use the Volume instruction, the computer will play all Phrases at half loudness, Volume mf.

As an example, suppose you have two Phrases of music. You want the computer to play Phrase 1, but you want to play Phrase 2 on your flute. You want the computer to display Phrase 2, but not to play it. Your Arrange Program would look like this:

Voice 1	Voice 2
1 Play Phrase 1	1 Display
2	2 Volume 0
3	3 Play Phrase 2
4	4

Now, Phrase 1 will play at half loudness while Phrase 2 is displayed on the video screen, but is not played. And your friends can see the notes you play as you you "jam" with your computer.

TRANPOSE

Music is transposed when it is played at a higher or lower pitch than it was written. The Transpose instruction will do this for each voice. You can play a phrase of music unchanged in one voice, and play the same phrase transposed in another voice.

For each voice, the Transpose instruction will affect all future phrases in that voice until the computer finds another transpose instruction in the same voice. To enter the Transpose instruction, type "T<ret>". The computer will respond with "# 1/2 steps?". It will accept any number from -36 to 36. Positive numbers, numbers without the minus sign, transpose up. They make the music sound higher in pitch. Minus numbers transpose down. They make the music sound lower in pitch.

Each 1/2 step is equivalent to the pitch change from a note that is played natural, to the same note played sharp. Say, D2 to D#2. Each minus 1/2 step-- each 1/2 step down-- is equivalent to the pitch change from a note that is played natural, to the same note played flat. Say, D2 to Db2.

As an example, suppose you want to play phrase 1 as it was written, then play it transposed up one octave (12 1/2 steps), then play it again as it was written. Your Arrange program would look like this:

- 1 Display
- 2 Play phrase 1
- 3 Transpose 12
- 4 Play phrase 1
- 5 Transpose -12
- 6 Play phrase 1
- 7

Step number 5, Transpose -12, takes the voice back to its original pitch ($12-12=0$). It is fairly easy to instruct the computer to transpose music out of the computer's three octave playing range. When this happens, the computer will do the best it can, but the results can be surprising.

GOTO/COUNT

These two instructions control the flow of your arrange program. Normally, the computer will do each instruction in order, from step 1 to the last step of the program. The Goto instruction changes that.

When the computer finds a Goto instruction it goes to the line number in that instruction. For example, suppose you want to play phrase 1, 2, and 3, then you want to play phrase 2 and 3 over and over. Your Arrange program would look like this:

```
1 Display
2 Play phrase 1
3 Play phrase 2
4 Play phrase 3
5 Goto 3
6
```

The computer will do each instruction in order until it gets to line #5, which tells it to go to line #3. It goes to line #3 and does each instruction in order until it gets to line #5, which tells it to go to line #3. And so on. And so on.

This is called a loop because it loops from line #5 to line #3. And, because it never stops looping (unless you turn the computer off, or hit the SYSTEM RESET key), it is called an infinite loop.

To enter the Goto instruction, type "G<ret>". The computer will respond with "Line #?". Type the line number you want it to Goto, and <ret>. The line numbers must be between 1 and 20. If you should instruct the computer to

Goto a line number that does not contain an instruction, it could become confused when it tries to run your Arrange program. So be sure to always Goto a line that has an instruction.

While the infinite loop Goto instruction is fine for playing the same thing over and over, it's not good for much else. Suppose you want to play phrase 1 three times, then play phrase 2 twelve times, each time transposed by one 1/2 step, then play phrase 1 again. To do something like this, the Goto instruction has to be "smarter". And it is.

This is where you need the Count instruction. The Count instruction will tell the Goto instruction how many times it should loop before going on to the next program line. An Arrange program to do the example above would look like this:

```
1 Display
2 Count 3
3 Play phrase 1
4 Goto 3
5 Count 12
6 Transpose 1
7 Play phrase 2
8 Goto 6
9 Transpose -12
10 Play phrase 1
11
```

Line 2 sets the Count to 3, so line 4 will loop back to line 3, three times. Then it goes on to line 5. Line 5 sets the Count to 12, so line 8 loops back to line 6 twelve

times. Each time through the first loop, the computer plays phrase 1. It plays three times. Each time through the second loop, the computer Transposes one 1/2 step and plays phrase 2. After the twelveth loop, it Transposes back down to where it was at the start, and plays phrase 1 a final time.

To enter the Count instruction, type "C<ret>". The computer will ask "Count #?". Type the number of times you want the next Goto instruction to loop, and <ret>. You can loop as many as 127 times. If you want to loop always (the infinite loop), enter a Count of -1.

If you do not use the Count instruction in your Arrange program, but you do use a Goto instruction, the Goto will assume a count of -1, and it will be an infinite loop.

EDIT KEYS

When first powered up, voice #1 will already have 2
program steps:

- 1 Display
- 2 Play phrase 1
- 3

These, or any other previously entered program steps can be changed (edited) by using the Edit Keys. Notice that one line number-- line number 3 in the example-- is darker than the other line numbers. It should be blue on a color TV. This is the current line cursor and it is where the next program step will be entered.

The four Edit Keys allow you to change the position of the current line cursor or to change what is in the current line. The Edit Keys are:

CTRL (up-arrow)	move current line cursor up
CTRL (down-arrow)	move current line cursor down
CTRL DELETE	delete instruction at current line
CTRL INSERT	insert instruction at current line

Whenever you type in an instruction it will be put into the line number that is shaded by the current line cursor. For example, if the cursor is on line number 3, and you want to change the instruction at line number 1, you use CTRL (up-arrow) to move up two lines. Hold CTRL down, then type (up-arrow) twice. Line 1 will now have the dark color. Any program step you enter will now go in this line. Anything already there will be replaced when you enter the new instruction.

If you want to delete what is on the current line and

not enter anything in its place, type CTRL DELETE. This erases what was on the current line, and moves everything up one line to close up the gap. CTRL INSERT has the opposite effect. It will move everything down one line, including what was previously there. The current line will be empty, ready for you to insert a program step.

LISTEN

The Listen command tells the computer to run the Arrange program. A short Arrange program is automatically entered into the computer memory when it first starts the Music cartridge. If you have not entered your own arrange program, then this default program will run.

Voice 1	Voice 2	Voice 3	Voice 4
1 Display	1 Play phrase 2	3 Play phrase 3	4 Play Phrase 4
2 Play phrase 1	2	2	2
3	3	3	3

This program plays phrases 1 to four simultaneously through voices 1 to 4. Also, it displays voice 1. If any of these phrases are not in the computer's memory, it ignores that play instruction. This allows you immediately to Listen to music you have entered in any of the four phrases, without stopping to write an Arrange program.

To "Listen" to your music, type "L<ret>", from the Main Menu. The computer will display the two staves, and it will play your music according to the Arrange program-- either the default program, or one you've entered. Then it will return to the Main Menu.

SAVE/RETRIEVE

These commands allow you to Save and Retrieve your music to and from external storage, usually cassette or disk.

"Save" sends the music data from the computer memory out to external storage. And "Retrieve" gets the data from external storage and puts it into the computer's memory. Except for this difference in the direction of the data flow, the two commands are alike.

When in the Main Menu, and you type "S<ret>" or "R<ret>" for "Save" or "Retrieve", the computer will respond with:

RAVE (or RETRIEVE) MUSIC

E Everything

AP All Phrases

AV All Voices

Px Phrase x

Vx Voice x

S Stop

FN?

Before you go any further, you must respond to the computer's "FN?" prompt, which stands for "File Name?".

The response to this, if you have a cassette, is "C:<ret>". If you have a disk drive, use standard Atari disk file names, as "D:MYMUSIC.V3". Refer to your Computer manual, your Basic manual or your Disk Operating System manual for more detail on cassette or disk operation.

After you have correctly entered the File Name of your music data, the computer will ask "Which?". Type "E<ret>"

to Save or Retrieve "Everything" -- all music (Phrases) and all Arrange programs (Voices).

If you only want to Save or Retrieve the music and not the Arrange programs, type "AP<ret>", for "All Phrases". And if you only want one of the 10 Phrases, type "Px<ret>". Only, instead of typing the "x", type one of the 10 Phrase numbers, 0 to 9, as "P2<ret>".

If you only want to Save or Retrieve the Arrange programs and not the music, type "AV<ret>", for "All Voices". And if you only want one of the 4 Voices, type "Vx<ret>". Instead of typing the "x", type one of the 4 Voice numbers, 1 to 4, as "V1<ret>".

The computer will ignore commands to Save Phrases or Voices that do not exist in its memory. And it won't Retrieve a phrase or voice that had not previously been saved. So, if you Save "All Phrases"; and then try to Retrieve "Everything", the computer will only Retrieve the phrases you had saved.

After you have Saved or Retrieved your music, type "S<ret>", for "Stop", and you are back in the Main Menu.

DOS

DOS stands for Disk Operating System, and is only used when you have a disk drive. Typing "D<ret>", for DOS puts you in the Atari DOS that was booted when you first turned on your system. The standard DOS commands are available, so you can examine the directory, and so on. Consult your Atari DOS manual for details.

Should you enter "D<ret>", and you do not have a disk drive, the computer will put you in it's blackboard mode. To return to the Music Composer Cartridge, press the "SYSTEM RESET" key.

PART TWO

A SAMPLE SESSION WITH THE ATARI MUSIC COMPOSER CARTRIDGE

ENTERING MUSIC

In this step-by-step session, you will enter the music for "Row, Row, Row Your Boat". This is a musical round, in which the music is repeated by each of the four voices in turn, each slightly behind the other.

With the computer off, insert the Atari Music Composer Cartridge. If you are using the Atari-800 computer, use the left cartridge slot. Turn on the computer. The program should display the Main Menu:

ATARI MUSIC

Edit music

Arrange music

Save

Retrieve

DOS

Listen

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WHICH?

The first phrase of the music you will enter is:

(music example here)

Row, row, row your boat / Gently down the stream

And the second phrase is:

(music example here)

Merrily, merrily, merrily, merrily / Life is but a dream.

This will be new music, so you will enter the Edit music command, and then erase all previous music in the phrase. Even though there may not have been any previous music entered, it's still a good idea to "clean the slate", so there won't be any surprises.

You type: E<ret>

The computer displays the Edit music menu.

You: P<ret>

The computer asks: PHRASE #?

You: 1<ret>

Computer: ERASE?

You: Y<ret>

The computer displays the empty music staves. The bottom line of the display asks: SMI, NOTE?

You: C4Q<ret>

The computer displays the first note and plays it. It is Middle C, a quarter note, or, in terms the computer can understand, C of Octave 4, a Quarter note. Now, enter the second note.

You: CQ<ret> The computer displays and plays both notes. They are both alike. You do not have to give the Octave number again until you wish to change to another octave. The next note, the third note in the first measure of the first phrase, is a dotted eighth note.

You: CE.<ret>

Notice that each time you enter a note the computer displays and plays all notes in the measure. The next note is a sixteenth note.

You: DS<ret>

The next note, the last note of the first measure, is a quarter note. But enter it as an eighth note, so you can go back and correct your "error".

You: EE<ret>

Now, change the incorrect eighth note.

You: CTRL <--

Note that "<--" is pressed while you are holding down "CTRL". The action of the editing keys is immediate, and you don't have to type <ret>.

The display shows the incorrect eighth note outlined by the cursor. Zap the note.

You: CTRL DELETE

The measure is displayed and played, minus the zapped eighth note. Now enter the correct note.

You: EQ<ret>

The entire first measure is played and displayed. Just to become more familiar with the editing keys, try entering a note, say a High C half note, between the first two notes of the measure. First, move the cursor to just behind the first note.

You: CTRL <--

CTRL <--

CTRL <--

CTRL <--

The cursor should now be in position behind the first note. Now you can insert the extra note.

You: C6H<ret>

That should give you a High C half note sandwiched between the two Middle C quarter notes. It sounds terrible.

Zap it.

You: CTRL <--

CTRL DELETE

Your measure is restored. Now go on to the 2nd measure.

You: M2<ret>

The two music staves are empty again, and the computer display says you are in Phrase 1, Measure 2. Notice that every time you enter a note, or change measures, the "### Free" message displays one number less. It counts down as you use up the available computer memory.

Enter the five notes of the second measure.

You: E4E.<ret>

DS<ret>

EE.<ret>

FS<ret>

GH<ret>

That gets you gently down the stream. Now go back to the Main Menu, and Listen to what you've entered so far.

You: S<ret>

That puts you back in the Edit music menu. Once again.

You: S<ret>

The computer should display the Main Menu.

You: L<ret>

That plays your music, and then returns you back to the Main Menu. Do it again.

You: L<ret>

Not bad. But suppose one of the notes was wrong. A note in the 2nd measure of Phrase 1, for example. To change the note, when you enter "change Phrase", you DO NOT respond

with "Y<ret>" to the prompt "ERASE?" because this would wipe out your entire phrase.

You: E<ret>

The Edit music menu is displayed. You want to change phrase #1, measure #2.

You: P<ret>

Computer: PHRASE #?

You: 1<ret>

Computer: ERASE?

You: N<ret>

Computer: MEASURE #?

You: 2<ret>

There you are, back in measure #2. You could change a note, if it were really wrong, by using the edit keys, as you did before. Now go back to the Main Menu.

You: S<ret>

The Edit music menu is displayed.

You: S<ret>

And you're in the Main menu. Just for fun, Listen to your music again.

You: L<ret>

Now tackle the 2nd phrase.

You: E<ret>

P<ret>

Computer: PHRASE #?

You: 2<ret>

Computer: ERASE?

You: Y<ret>

You're back with the music staves, ready to enter more

music.

The first measure of Phrase 2 is a problem. Notice the number 3 over each of the groups of three notes in this measure. This means they are tripletts. Tripletts are three notes played in the time it would normally take to play two of the notes. The computer won't accept tripletts as such, so you need to "fudge" a little. Think of the measure as rewritten in its (almost) equivalent form:

(music example here)

Now enter these revised twelve notes of the measure:

You: C5S<ret>

CS.<ret>

CS.<ret>

G4S<ret>

GS.<ret>

GS.<ret>

ES<ret>

ES.<ret>

ES.<ret>

CS<ret>

CS.<ret>

CS.<ret>

When the computer played the measure after you entered the last note, it did not display the first eleven notes. It played all twelve notes but only displayed the last note. The screen was full, so it just tucked them away. If you want to see the notes, use the editing key to move the cursor back.

You: CTRL <--

CTRL <--

The computer displays the first eleven notes of the measure. Now, go on to the last measure.

You: M2<ret>

Enter the five notes.

You: G4E.<ret>

FS<ret>

EE.<ret>

DS<ret>

CH<ret>

That does it! Go back to the Main Menu.

You: S<ret>

S<ret>

Now you want to listen to the music you've entered.

You: L<ret>

The computer played phrase 1 and phrase 2 together. You want to hear them played one after another. For this, you need to change the Arrange program.

ARRANGING MUSIC

When the computer is first turned on, the Arrange program is preset to play phrases 1 to 4 together through voices 1 to 4. You want to hear phrase 1, then phrase 2. You don't want to hear them together yet.

First, zap the instruction that plays phrase 2. That's the first (and only) instruction in voice 2.

You: A<ret>

Computer: VOICE #?

You: 2<ret>

Since this is the first time you've entered the Arrange music command, the computer displays the Arrange Menu. After this, it will only display the Arrange Menu when you type "M<ret>". You want to go on.

You: <space bar>

The computer displays the "Arrange Voice 2" program. The only instruction in it is "PLAY PHRASE 2". You want to delete that instruction.

You: CTRL (up arrow)

This moved the dark colored line pointer -- the cursor -- up to line 1. Now zap the instruction.

You: CTRL DELETE

This leaves you with 20 empty program lines. Later, you will give voice 2 some new instructions. But for now, go back to the Main Menu.

You: S<ret>

Listen to the music.

You: L<ret>

Only phrase 1 played. You want phrase 2 to play after

Phrase 1 plays.

You: A<ret>

Computer: VOICE #?

You: 1<ret>

The computer displays the two steps of the "Arrange Voice 1" program. You want to add a 3rd step, to play phrase 2.

You: P<ret>

Computer: PHRASE #?

You: 2<ret>

The computer enters "PLAY PHRASE 2" in line 3 of the Arrange program. Now, go back to the Main Menu and Listen to your music.

You: S<ret>

L<ret>

The computer played both phrases, and returned you to the Main Menu. Play it again, Sam.

You: L<ret>

That's nice, but this is really supposed to be a musical round. Each of the four voices should play one measure behind the previous voice. Since the phrases are two measures long, you need to enter one more phrase of music: a whole note rest. This will allow you to "play" one measure of silence.

You: E<ret>

P<ret>

Computer: PHRASE #?

You: 3<ret>

Computer: ERASE?

You: Y<ret>

The computer displays the two empty music staves.

You: RW<ret>

A whole note rest is displayed.

You: S<ret>

S<ret>

You are back in the Main Menu. Phrase 3 now contains one measure of silence. Now you are ready to program your round.

Here is the Arrange Program you will enter:

Voice 1	Voice 2	Voice 3	Voice 4
1 Display	1 Volume mp	1 Volume mp	1 Volume mp
2 Play phrase 1	2 Play phrase 3	2 Play phrase 3	2 Play phrase 3
3 Play phrase 2	3 Play phrase 1	3 Play phrase 3	3 Play phrase 3
4 Play phrase 1	4 Play phrase 2	4 Play phrase 1	4 Play phrase 3
5 Play phrase 2	5 Play phrase 1	5 Play phrase 2	5 Play phrase 1
6 Play phrase 3	6 Play phrase 2	6 Play phrase 1	6 Play phrase 2
7 Play phrase 3	7	7 Play phrase 2	7 Play phrase 1
8 Play phrase 3	8	8	8 Play phrase 2
9	9	9	9

Voice 1 will play the two phrases of music twice. At reduced volume (default volume is mf), the other voices will enter, each one meter (phrase 3) behind the previous voice. After each voice plays the two phrases of music twice, the voice becomes silent. The last voice to play is voice 4, which ends up the round by playing alone, just as voice 1 started playing alone. Voice 1 is programmed to play phrase 3 -- the whole note rest -- just so you can see it on the display.

Each voice's arrange program is entered separately.

Start with voice 1.

You: A<ret>

Computer: VOICE #?

You: 1<ret>

The computer displays the 20 program steps. The first 3 instructions are already entered, so you start with line 4.

You: P<ret>

1<ret>

Notice that each time you enter an instruction, the cursor moves down a line. New instructions are always entered at the cursor. If you make a mistake, you can use CTRL (up arrow) and CTRL (down arrow) to reposition the cursor, and reenter the proper instruction. If you do this, be sure to use the CTRL (down arrow) to move the cursor to the first empty line before continuing.

The cursor should now be at line 5. Enter the remaining program steps for voice 1.

You: P<ret>

2<ret>

P<ret>

3<ret>

P<ret>

3<ret>

P<ret>

3<ret>

That's it for voice 1. Go back to the Main Menu, and Listen.

You: S<ret>

L<ret>

Go on to voice 2.

You: A<ret>

Computer: VOICE #?

You: 2<ret>

Enter the six Program steps.

You: V<ret>

MP<ret>

P<ret>

3<ret>

P<ret>

1<ret>

P<ret>

2<ret>

P<ret>

1<ret>

P<ret>

2<ret>

Go to the Main Menu, and Listen.

You: S<ret>

L<ret>

Enter the Program for voice 3.

You: A<ret>

Computer: VOICE #?

You: 3<ret>

The instruction in line 1 says "PLAY PHRASE 3". You want that in line 2, and "VOLUME MP" to be in line 1. For this, you move the cursor to line 1 and insert the Volume instruction.

You: CTRL (up arrow)

The cursor goes to line 1.

You: CTRL INSERT

The instruction in line 1 is moved down to line 2. The cursor remains at line 1, indication this is where the next instruction will be entered.

You: V<ret>

mp<ret>

Your "VOLUME 4" instruction is entered in line 1, but the cursor remains there also. You must move the cursor down to the next empty line, line 3.

You: CTRL (down arrow)

CTRL (down arrow)

That puts the cursor at line 3. Now enter the remaining instructions for voice 3.

You: P<ret>

3<ret>

P<ret>

1<ret>

P<ret>

2<ret>

P<ret>

1<ret>

P<ret>

2<ret>

Stop, and Listen.

You: S<ret>

L<ret>

And, on to the fourth and last voice.

You: A<ret>

Computer: VOICE #?

You: 4<ret>

You don't want instruction 1, "PLAY VOICE 4", at all.

So delete it.

You: CTRL (up arrow)

CTRL DELETE

Enter your instructions for voice 4.

You: V<ret>

MP<ret>

P<ret>

3<ret>

P<ret>

3<ret>

P<ret>

3<ret>

P<ret>

1<ret>

P<ret>

2<ret>

P<ret>

1<ret>

P<ret> .

2<ret>

That's it! Stop, and Listen.

You: S<ret>

L<ret>

And Listen again.

You: L<ret>

You might try experimenting with your arrange Program by changing or inserting volume levels, or by entering other Program steps. But before you do that you'd better save your music onto your cassette or disk.

SAVING AND RETRIEVING MUSIC

From the Main Menu, the command "S<ret>" means "Save", not "Stop", as in the other sub-menus. "Save" allows you to store your music onto your cassette or disk. "Retrieve" allows you to put that music back into the computer memory.

When you type "S<ret>", to Save music, the computer will display the "SAVE MUSIC" menu and ask "FN?". It wants a standard Atari file name, as "C:" for cassette, or "D:ROWBOAT" for disk. Refer to your operator's manuals for further details. In this example, we assume you have a cassette. You start from the Main Menu.

You: S<ret>

The computer displays the Save Music menu.

Computer: FN?

You: (when console beeps twice, start your cassette recording) C:<ret>

Computer: WHICH?

You: E<ret>

Computer: WHICH?

You: S<ret>

AFTER the computer displays the Main Menu, stop your cassette, and rewind it. Your music is saved. The steps to Retrieve your music again are almost the same.

You: R<ret>

The computer displays the Retrieve Music menu. This is the same as the Save menu, except it says "RETRIEVE MUSIC" on the top line instead of "SAVE MUSIC". Again, the computer asks for a file name.

Computer: FN?

You: (when console beeps once, start your cassette
playing) C:<ret>

Computer: WHICH?

You: E<ret>

Computer: WHICH?

You: S<ret>

Stop your cassette after the computer displays the Main
Menu. Your music has been entered again into memory, and
you are ready to go!

PART THREE

THE MUSIC FILE STRUCTURE

GENERAL FILE FORMAT

The purpose of this section of this manual is to allow you to write or manipulate music files for the Music Composer in BASIC. It is a rather technical section, and before attempting it you should already be familiar with the Music Composer Cartridge, and with Atari BASIC.

Files for the Music Composer contain up to three different types of records. The three types of record correspond to the Save Music commands to save phrases, to save voices, and to save everything. Each of these records starts with a header byte, 170, and ends with an end of record byte, 255. The last record in the file has an additional end of file byte, also 255.

Records may be in any order. The second byte of each record, right after the header byte, identifies which of the three record types it is, and thus how the record data bytes are to be interpreted.

PHRASE RECORD

A phrase record contains pitch and duration values for a given phrase. It is the actual program for playing the notes in one of the ten Music Composer Phrases, and corresponds to the Enter Music command. When you Save or Restore Phrase x, or All Phrases, you are saving or restoring phrase records. Since there are ten possible phrase numbers, 0 to 9, there can be up to ten different phrase records.

Phrase records can be in any order, and can be mixed with the other records in any way. If the computer encounters more than one phrase record with the same phrase number, the last one read is the one used.

The phrase record format:

VALUE	INTERPRETATION
170	Header byte
0-18	Identifier byte
0-127	Pitch, Rest, or Measure byte
0-255	Duration byte
0-127	Pitch, Rest, or Measure byte
0-255	Duration byte
....
....
0-127	Pitch, Rest, or Measure byte
0-255	Duration byte
255	End Of Record byte

If the identifier byte is 18 or less, it identifies the record as a phrase record. Divide it by two for the correct

phrase number. Thus, an identifier byte of 18 is phrase 9, 10 is phrase 5, and 0 is phrase 0.

The pitch byte is a combination of octave, letter name, and accidental information. The corresponding values for each of these parts of the pitch byte are:

Octave	Value
3	0
4	7
5	14
6	21

Letter name	Value
C	0
D	1
E	2
F	3
G	4
A	5
B	6

Accidental	Value
Natural	0
Sharp	1
Flat	2

To pack these three separate value items into a single byte, follow this formula:

Pitch = 4(Letter name value + Octave value) + Accidental value

Or, in BASIC:

10 PITCH=4*(NAME+OCTAVE)+ACCIDENTAL

Do not attempt to give the computer note values above C of Octave 6 (Pitch value 84), or you may loose data. Rests are denoted by a pitch value of 85. This would translate to C# of Octave 6, but since the computer can only play to C of Octave 6, there is no conflict. Pitch values of 127 indicate a measure bar is to be displayed on the screen. Pitch values of 128-254 are invalid.

Valid values for the pitch byte:

Value	Intrepretation
0-84	pitch from C, Octave 3 to C, Octave 6
85	rest
86	pitch of Cb, Octave 6
87-126	invalid
127	measure bar
128-254	invalid
255	end of phrase

Duration bytes, like pitch bytes, are actually a combination of three seperate items of information:

Note	Value
Thirty-second	0
Sixteenth	2
Eighth	4
Quarter	6
Half	8
Whole	10

Tie (Legato)	128
no tie	0
Dot	1
no dot	0

The formula for the duration byte is:

Duration = Note value + Tie + Dot

Or, in BASIC:

```
10 DURATION=NVALUE+TIE+DOT
```

A duration value byte will always follow a pitch value byte, unless the pitch value byte is 255, end of phrase. If the pitch value byte is 127, a measure bar, then a duration byte must follow, but it's value is ignored. It's a good idea to make the duration byte value also 127, so it will show up better when you examine the file data.

VOICE RECORD

A voice record is the actual program for playing one of the four voices. It corresponds to the Arrange music command. When you Save or Retrieve Voice x, or All Voices, you are saving or retrieving voice records.

There is one important difference between entering an Arrange program with the Music Composer Cartridge, and writing a voice record file with BASIC: When you write a voice record in BASIC you can have up to 127 program steps per voice (although only the first 20 steps -- the limit of the Arrange voice command -- will be displayed).

Like all the Music Composer records, the voice record starts with a header byte, 170, and ends with an end of record byte, 255. The identifier byte, directly following the header byte identifies the record as a voice record and identifies the voice number, 1 to 4. The identifier byte for each of the four voices is:

Value	Interpretation
20	Arrange voice 1
22	Arrange voice 2
24	Arrange voice 3
26	Arrange voice 4

Following the identifier byte are the command byte and the operand byte for each line of the Arrange voice program.

Voice records can be in any order and can be mixed with the other records in any way. If the computer encounters more than one voice record for the same voice, the last one read is the one used.

The voice record format:

Value	Intrepretation
170	Header byte
20-26	Identifier byte
0-6	Command byte
0-255	Operand byte
0-6	Command byte
0-255	Operand byte
....
....
0-6	Command byte
0-255	Operand byte
255	End of record byte

Note that there are no line numbers as such. The computer keeps track of line numbers by the position of the command-operand byte pair. The first is line 1, the 2nd is line 2, and so on.

Valid command bytes are the numbers 0-6. A command byte value greater than 6 will give unpredictable results, and may lose data.

Valid command bytes:

Value	Intrepretation
0	Null (empty line)
1	Goto
2	Play phrase
3	Transpose
4	Volume
5	Display
6	Count

Valid operands are the same as the operands you would type in with the Arrange voice command, with three exceptions. First, you may Goto a line greater than 20, up to line number 127. Second, negative numbers are indicated by adding 128 to the absolute value. Thus, -1 is 129, -7 is 135. And the third exception is that the volume designations 0, pp, p, mp, mf, f, and ff become the numbers 0 to 7.

Also, be warned that the computer checks for errors only on input from the Arrange voice command. It does not check the data once it is entered in memory. So, invalid commands or operands from a BASIC generated voice record will very likely cause a system crash.

MISCELLANEOUS INFORMATION RECORD

There is only one miscellaneous information record, and it's name is longer than it is. This record is used, along with voice and phrase records, only with the Save or Retrieve Everything commands. If the computer encounters more than one miscellaneous information record, the last one read is the one used.

The time signature, the tempo, and the key signature are the only information contained in this record. The miscellaneous information format:

Value	Interpretation
170	Header byte
128	Identifier byte
2,4,8	Bottom number of time signature
9-2	Top number of time signature
0-255	Tempo
0-7, 128-135	Key signature
255	End of record

The first byte after the identifier byte, 128, is the bottom number of the time signature. It indicates which note gets a beat. This should be 2, 4, or 8, for half, quarter, or half notes. Other values will give unpredictable results.

The next byte is the top number of the time signature. It indicates the number of beats per measure. Valid numbers for this byte are 2 through 9, except for a time signature of 8/2 or 9/2. Again, invalid values give unpredictable results.

Any number is valid for the tempo byte. A value of 1 is

the fastest tempo possible. 255 is next to the slowest, and 0 is the slowest: almost never.

The key signature byte is a value of 0-7 for the number of sharps, or a value of 0-7 plus 128 (128-135), for the number of flats.

A BASIC PROGRAM TO DUMP MUSIC FILES

This very short BASIC program will enable you to dump Music Composer files onto the screen as blocks of numbers. It is useful for examining files generated by the Music Composer Cartridge, and for debugging files you have created with external programs.

Since Atari BASIC has different file handling routines for cassette and for disk, the first few lines of the program are different for the two types of media.

If you have a cassette:

```
10 REM DUMP MUSIC COMPOSER FILES
20 REM
30 REM OPEN CASSETTE FILE
40 REM
50 DIM Q$(1):OPEN#3,4,0,"C:"
```

And if you have a disk:

```
10 REM DUMP MUSIC COMPOSER FILES
20 REM
22 REM OPEN DISK FILE
24 REM
30 DIM FILE$(14),Q$(1)
40 PRINT "FILE NAME":INPUT FILE$
50 OPEN #3,4,0,FILE$
```

The remainder of the program is identical for either cassette or disk.

```
60 REM
70 REM LOOK FOR RECORD START (170)
80 IF END BYTE (255) THEN EXIT
90 REM
100 GET#3,BYTE
110 IF BYTE=255 THEN PRINT "255 (END OF FILE)";:END
120 IF BYTE<>170 THEN 100
125 PRINT:PRINT BYTE;" ";;GET #3,BYTE
130 REM
140 REM PRINT RECORD BYTE
150 REM
160 IF BYTE<20 THEN PRINT BYTE;" (PHRASE RECORD - PHRASE # ";
    BYTE/2;"")":GOTO 210
170 IF BYTE <27 THEN PRINT BYTE;" (VOICE RECORD - VOICE # ";
    (BYTE-20)/2+1;"")":GOTO 210
180 PRINT BYTE;" (MISC. INFO. RECORD)"
190 REM
200 REM FETCH RECORD DATA
205 REM
210 GET #3,BYTE:IF BYTE=255 THEN PRINT BYTE:INPUT Q$:GOTO 100
220 PRINT BYTE;" ";;GOTO 210
```

A sample program run follows. User inputs are
in square brackets.

[RUN<ret>]

FILE NAME?[D:DUMMY.MUS<ret>]

170 128 (MISC. INFO. RECORD)

4 4 0 1 255? [<ret>]

170 22 (VOICE RECORD - VOICE #2)

2 0 255? [<ret>]

170 20 (VOICE RECORD - VOICE #1)

5 1 2 1 255? [<ret>]

170 2 (PHRASE RECORD - PHRASE #1)

127 127 4 11 127 127 0 11 255? [<ret>]

170 0 (PHRASE RECORD - PHRASE #0)

127 127 85 9 32 9 127 127 36 9 28 9 255? [<ret>]

255 (END OF FILE)

READY

The first byte of each record is always 170, the record header byte. In the sample run, the second byte found was 128, which identifies the record as a Misc. Info. record. The next two bytes indicate a time signature of 4/4. Tempo, the next byte, is one. Next, the key signature is 0 for 0 sharps, or C Major. And the last byte is 255, end of record.

The second record is identified as a Voice Record for Voice #2. There are only two data bytes in the record, 2 and 0. The first of these, 2, is the command byte to Play Phrase; and the second byte, 0, is the operand byte, Phrase 0. Instructions in the four data bytes of the next record, Play Phrase #1, are to Display (5) voice #1 (1), and to Play (2) voice #1 (1).

Note that the data in the final two records, Phrase record #1 and Phrase record #2, start with measure bar bytes, 127 127. Phrase records must always start with measure bar bytes, or the computer becomes confused on how to display the notes.

When an end of record byte, 255, is followed by a second

value of 255, this is reconized as an end of file, and the
program ends.

SAMPLE BASIC COMPOSING PROGRAMS

These next two programs are examples of what might be done to write Music Composer files in BASIC. They are intended as guidelines only. You can do better.

First, is a fairly short program to write notes randomly, but with a few simple rules.

(Program listing here)

This next program is an adaptation of the Harmony program presented by John G. Kemeny and Thomas Kurtz in their book "Basic Programming". The program is discussed in detail in this book. It's one of the best books on BASIC programming, written by the originators of the language. Briefly, the program asks for phrase numbers as input. Any number of phrases can be given, in any order. Phrases may also be repeated. When a phrase number >9 is given the program stops asking for input and starts to calculate the harmony lines. It shifts all the melody phrases to the top octave and writes that inot phrase #1, the three harmony lines are put into phrase records 2,3 and 4.

Note that this program, as written, will not work with a cassette, as it requires multiple accesses of the same phrase record. Also, it only "understands" phrase records. So it's input may not contain Voice records, or Misc. Info. records. Once again, this is not an ideal program. It is included here to give you an idea of some of the possibilities of writing your own Music Composer files in BASIC. Good luck!

(Program listing here)

PART FOUR

QUICK GUIDE TO THE ATARI MUSIC COMPOSER CARTRIDGE

COMMANDS FROM THE MAIN MENU

Command: Change music

Prompt: WHICH?

Syntax: C<ret>

Display: Change Music Menu.

Action: Allow changes to existing music.

Command: Arrange music

Prompt: WHICH? VOICE#?

Syntax: A<ret>(1-4)<ret>

Display: Arrange Menu when first called, Arrange Voice
program thereafter.

Action: Write or change the program that
plays music through the four voices.

Command: Save

Prompt: WHICH? FN?

Syntax: S<ret>(C: or D:FILENAME)

Display: Save Music Menu.

Action: Allow music in memory to be saved
onto external media (cassette, disk).

Command: Retrieve

Prompt: WHICH? FN?

Syntax: R<ret>(C: or D:FILENAME)<ret>

Display: Retrieve Music Menu.

Action: Allow music on external media to be
put into memory.

Command: DOS

Prompt: WHICH?

Syntax: D<ret>

Display: DOS menu.

Action: Enter DOS.

Command: Listen

Prompt: WHICH?

Syntax: L<ret>

Display: Music staves; notes as programmed.

Action: Play music through the four voices
as programmed by Arrange music.

COMMANDS FROM EDIT MUSIC

Command: Phrase

Prompt: WHICH? Phrase #? ERASE? Measure #?

Syntax: P<ret>(0-9)<ret>(Y-N)<ret>(meas. #)<ret>

Display: Music staves of measure and phrase
selected. Music input menu.

Action: Allow type-in and change of music, as in
"New music", but do not erase phrase.

Command: Meter

Prompt: WHICH? METER?

Syntax: M<ret>(beats)/(note)<ret>

(beats) = beats per measure: 2-9.

(note) = which note gets a beat: 2, 4, 8.

8/2 and 9/2 are not allowed.

Display: Meter status changes to new time signature.

Action: Sets time signature. Has no effect
on how the music is actually played.

Command: Check measures

Prompt: WHICH?

Syntax: C<ret>

Display: Check measures status changes from "OFF"
to "ON", or vice-versa.

Action: When "ON", and in music input menu, checks
for the proper number of beats per measure.

Command: Key Sis.

Prompt: WHICH? NEW KEY?

Syntax: K<ret>(0-7)(S-F)<ret>

(0-7) = number of sharps or flats.

(S-F) = S for Sharps, F for Flats.

Display: Key status changes to reflect new key.

Action: Displays music in new key.

Command: Tempo

Prompt: WHICH? NEW TEMPO?

Syntax: T<ret>(1-9)<ret>

Display: Tempo status changes to reflect new tempo.

Action: Changes overall tempo of music.

Command: Stop

Prompt: WHICH?

Syntax: S<ret>

Display: Main Menu.

Action: Exit from Change music menu to Main Menu.

COMMANDS FROM CHANGE PHRASE

Command: Stop

Prompt: SMI, NOTE?

Syntax: S<ret>

Display: Edit menu.

Action: Exit to Edit menu.

Command: Measure

Prompt: SMI, NOTE?

Syntax: Mx<ret>

Note: 'x' is next measure number or any
previously entered measure. If 'x' is
omitted, next measure number is assumed.

Display: Measure 'x'.

Action: Move to Measure 'x', display the measure
and, if there are any notes in it, play them.
If 'x' is the current measure number, it
is replayed.

Command: Insert measure

Prompt: SMI, NOTE?

Syntax: I<ret>

Display: Current measure, but empty of notes.

Action: Starting with the current measure, move
all measures up one measure number. Leave
new current measure empty of notes.

Command: enter next NOTE

Prompt: SMI, NOTE?

Syntax (general example):

LETTER (ACCIDENTAL) [OCTAVE] DURATION (DOT) (TIE)

LETTER: C, D, E, F, G, A, B, R (Rest)

ACCIDENTAL (optional): S-Sharp, F-Flat, N-Natural

OCTAVE [if omitted, last octave is used]: 1, 2, 3

DURATION: W-Whole note

H-Half note

Q-Quarter note

E-Eighth note

S-Sixteenth note

T-Thirty-second note

DOT (optional): period (".")

TIE (optional): T

Syntax (examples):

CS2E.T<ret>

CNQ<ret>

RW<ret>

Display: Current measure, with entered note. Cursor
moves behind entered note.

Action: Enter note directly in front of cursor.
Play measure.

COMMANDS TO ARRANGE MUSIC

Command: Count

Prompt: CDGMPSTV? COUNT#?

Syntax: C<ret>(1-127)<ret>

Display: "COUNT XXX" @ last cursor position.

Action: Count instruction entered into program.

The next Goto instruction will loop XXX times.

Command: Display

Prompt: CDGMPSTV?

Syntax: D<ret>

Display: "DISPLAY" @ last cursor position.

Action: Current voice is displayed on screen,

until another voice gives Display instruction.

Command: Goto

Prompt: CDGMPSTV? LINE#?

Syntax: G<ret>(1-20)<ret>

Display: "GOTO XX" @ last cursor position.

Action: Arrange program loops to line XX. If a
Count number was previously given, Goto loops
that many times, then continues to the next
instruction. If no Count instruction was
previously given, goto loops continuously.

Command: Menu

Prompt: CDGMPSTV?

Syntax: M<ret>

Display: Arrange Music Menu.

Action: Displays the Arrange Music menu, to decode

the magic word "CDGMPSTV?". Type any key
to return to the Arrange Voice program.

Command: Play Phrase

Prompt: CDGMPSTV? PHRASE#?

Syntax: P<ret>(0-9)<ret>

Display: "PLAY PHRASE X" @ last cursor position.

Action: Plays the phrase through the
current voice.

Command: Stop

Prompt: WHICH?

Syntax: S<ret>

Display: Main Menu.

Action: Exit from Arrange voice to Main Menu.

Command: Transpose

Prompt: CDGMPSTV? # 1/2 STEPS?

Syntax: T<ret>(-36 to 36)<ret>

Display: "TRANPOSE XX" @ last cursor position.

Action: All music in current voice is transposed,
until another Transpose instruction is given.

Command: Volume

Prompt: CDGMPSTV? VOLUME?

Syntax: V<ret>(0, pp, p, mp, mf, f, ff)<ret>

Display: "VOLUME XX" @ last cursor position.

Action: New volume is set for all music in the
current voice, until another Volume instruction
is given.

COMMANDS TO SAVE OR RETRIEVE MUSIC

Command: E E Everything

Prompt: WHICH?

Syntax: E<ret>

Display: Main Menu, after end-of-file.

Action: All phrases, all voice programs, and the
Edit music data are Saved/Retrieved.

Command: AP All Phrases

Prompt: WHICH?

Syntax: AP<ret>

Display: Main Menu, after end-of-file.

Action: All Phrases are Saved/Retrieved.

Command: AV All Voices

Prompt: WHICH?

Syntax: AV<ret>

Display: Main Menu, after end-of-file.

Action: All Arrange Voice Programs are
Saved/Retrieved.

Command: Px Phrase x

Prompt: WHICH?

Syntax: P(0-9)<ret>

Display: Main Menu, after end-of-file.

Action: Phrase x (0-9) is Saved/Retrieved.

Command: Vx Voice x

Prompt: WHICH?

Syntax: V(1-4)<ret>

Display: Main Menu, after end-of-file.

Action: Arrange voice x (1-4) is Saved/Retrieved.

Command: Stop

Prompt: WHICH?

Syntax: S<ret>

Display: Main Menu.

Action: Exit from Save/Retrieve to Main Menu.

FILE FORMATS

Miscellaneous information format:

Value	Intrepretation
170	Header byte
128	Identifier byte
2,4,8	Bottom number of time signature
9-2	Top number of time signature
0-255	Tempo
0-7, 128-135	Key signature
255	End of record

Phrase Record Format:

VALUE	INTERPRETATION
170	Header byte
0-18	Identifier byte
0-127	Pitch, Rest, or Measure byte
0-255	Duration byte
0-127	Pitch, Rest, or Measure byte
0-255	Duration byte
....
....
0-127	Pitch, Rest, or Measure byte
0-255	Duration byte
255	End of record byte

The Voice Record Format:

Value	Intrepretation
170	Header byte
20-26	Identifier byte
0-6	Command byte
0-255	Operand byte
0-6	Command byte
0-255	Operand byte
....
....
0-6	Command byte
0-255	Operand byte
255	End of record byte

